PATENT ABSTRACTS OF JAPAN

(11)Publication number : 2002-166352
(43)Date of publication of application : 11.06.2002

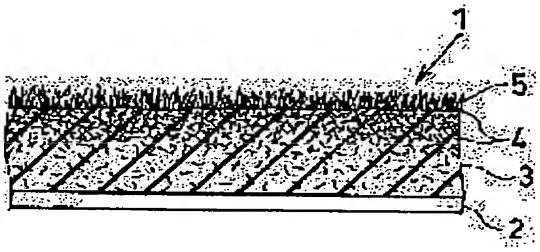
(51)Int.Cl. B24B 37/00
H01L 21/304

(21)Application number : 2000-362599
(22)Date of filing : 29.11.2000

(71)Applicant : NITSUSEN:KK
(72)Inventor : HAYAKAWA TETSUO

(54) POLISHING MATERIAL FOR WET POLISHING

(57)Abstract:
PROBLEM TO BE SOLVED: To provide a polishing material less producing scratches on a polished body when a hard disk, a glass pane, and a semiconductor are wet-polished.
SOLUTION: In this polishing material for wet polishing comprising a base material for polishing material and a polishing material layer forming a polyurethane resin porous layer formed on the base material and having a porous cell structure exposed by grinding the surface thereof, short fibers of extremely fine synthetic fibers are contained by 0.1 to 20 pts.wt. against the polyurethane resin of 100 pts.wt., and the short fibers of the extremely fine synthetic fibers are raised on the upper surface of the polishing material layer by the grinding of the polyurethane resin porous layer.



LEGAL STATUS

[Date of request for examination]

[Date of sending the examiner's decision of rejection]

[Kind of final disposal of application other than the examiner's decision of rejection or application converted registration]

[Date of final disposal for application]

[Patent number]

[Date of registration]

[Number of appeal against examiner's decision of rejection]

[Date of requesting appeal against examiner's decision of rejection]

[Date of extinction of right]

* NOTICES *

1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention] This invention is a hard disk, glass, or the abrasives for chemical polishing for semi-conductors, and relates to the abrasives especially used at the time of those manufactures etc. The abrasives of this invention are the abrasives improved in order to suppress that divide and a scratch blemish occurs on the ground body.
[0002]
[Description of the Prior Art] The abrasives to which the polyurethane resin fine porous layer was made to form on base materials, such as a plastic film, for example, polyester film etc., grinding of the front face was carried out as chemical-polishing material used for polish processing performed while the so-called chemical mechanical polishing, i.e., an abrasive material, is dropped at the time of a hard disk, glass, and semi-conductor manufacture etc., and the fine porosity cellular structure was exposed are already put in practical use.
[0003]
[Problem(s) to be Solved by the Invention] However, the above abrasives have a problem of ****** or a cone in a scratch blemish in the ground body during polish. The following things can be considered as the cause. First, even if the above abrasives are the cases where the cell size of a polyurethane resin fine porous layer is more greatly adjusted at the time of the manufacture, the smooth nature of the front face to grind tends [comparatively] to become high. Moreover, since the polish waste which secondary condensation of an abrasive material tends to take place during polish, and is produced by polish since spacing (a chisel decision of the viscosity of an abrasive material, the grain size of a polish particle, the relative velocity between abrasives and the ground body, etc. is therefore made) of abrasives and the ground body is comparatively narrow cannot be eliminated efficiently, it is easy to produce the bank of an abrasive material and polish waste. Consequently, the ground body will be ground with comparatively smooth abrasives with a big lump relatively [the aggregate of an abrasive material], and it is considered that it makes the ground body generate a scratch blemish.
[0004] this invention persons examined wholeheartedly the chemical-polishing material for using it for a hard disk, glass, and a semi-conductor so that they may solve the above-mentioned problem. And when the abrasives which have the abrasives layer to which the piloerection of this staple fiber was carried out in the porous cellular structure upper part obtained by carrying out grinding of the upper part of the polyurethane resin fine porous layer which mixed the staple fiber of a super-thin synthetic fiber beforehand before foaming were manufactured and the above chemical polishing was performed using these abrasives, it found out that generating of the scratch blemish on the hard disk which is the ground body, glass, and the front face of a semi-conductor could be decreased extremely.
[0005]
[Means for Solving the Problem] Therefore, this invention, in the base material for abrasives, and the abrasives for chemical polishing which consist of an abrasives layer which is a polyurethane resin fine porous layer formed on this base material, and the fine porosity cellular structure has exposed by the

grinding of the front face The staple fiber of a super-thin synthetic fiber does not have the 0.1 weight section in said polyurethane resin fine porous layer to this polyurethane resin 100 weight section, and 20 weight sections content is carried out. And it is related with the abrasives for chemical polishing characterized by the piloerection of the staple fiber of said super-thin synthetic fiber being carried out to the upper part of said abrasives layer by the grinding of this polyurethane resin fine porous layer. Hereafter, the configuration of the abrasives of this invention is explained for every each part material.
[0006]
[Embodiment of the Invention] A polyurethane resin [which is used for the above-mentioned abrasives layer] fine porous layer is formed by the well-known approach generally called the wet solidifying method. That is, this is a foam layer formed by being immersed in the non-solvent of the polyurethane resin, such as water and alcohol, after applying the solution which dissolved polyurethane resin in the hydrophilic solvent, for example, dimethyl formamide etc., on a base material. Conventionally, by only carrying out grinding of the part of an opposite hand to the upper part of this formed polyurethane resin fine porous layer, i.e., a base material, a part for a part for the pore of the fine porosity cellular structure of this resin and a wall was exposed, and that concavo-convex front face was used as the abrasives layer front face. However, in this invention, it is characterized by exposing the fine porosity cellular structure by carrying out grinding of this polyurethane resin fine porous layer by carrying out foam to this polyurethane resin on a base material using what added the staple fiber of a super-thin synthetic fiber, and forming a polyurethane resin fine porous layer, and making the upper part of an abrasives layer carry out the piloerection of the staple fiber of said super-thin synthetic fiber. Concretely, the structure of the abrasives of this invention is typically shown in drawing 1 R> 1. That is, the abrasives 1 of this invention form the polyurethane resin fine porous layer 3 which mixed the staple fiber 4 of a super-thin synthetic fiber as an abrasives layer on the base material 2 for abrasives. By carrying out grinding of the upper part, and making it expose, the polyurethane resin fine porous layer 3 has the staple fiber 5 of the super-thin synthetic fiber by which the piloerection was carried out in the upper part.
[0007] In order to carry out the piloerection on a polyurethane resin abrasives layer, especially the staple fiber of the super-thin synthetic fiber added to polyurethane resin consists of a synthetic fiber chosen from the group which consists of nylon fiber, polyester fiber, an acrylic fiber, a polypropylene fiber, and a polyethylene fiber, although not limited. Especially desirable super-thin synthetic fibers are nylon fiber with easy super-thin-izing, and polyester fiber. That with which one sort of things also mixed two or more sorts of a super-thin synthetic fiber is sufficient as these super-thin synthetic fibers.
[0008] If it takes into consideration that the air bubbles in the case of foaming move toward a layer top front face from the staple fiber of a super-thin synthetic fiber having specific gravity lighter than a polyurethane resin solution, the consistency of this super-thin synthetic fiber will become high like the upper part of a polyurethane resin layer. Therefore, it is expected that the piloerection of the polyurethane resin porous-layer front face obtained by carrying out grinding of the surface upper part of the formed polyurethane resin fine porous layer will be carried out quite precisely. It must be made to have to foam to the polyurethane resin with which the piloerection condition of the staple fiber of the super-thin synthetic fiber by which the piloerection is carried out contains the staple fiber of a super-thin synthetic fiber while precision is called for in the polish layer of this invention, at homogeneity so that the homogeneous fine porosity cellular structure may be formed as abrasives. Then, the fineness of the staple fiber of a super-thin synthetic fiber, die length, and a mixed ratio need to examine the range which suits these conditions most.
[0009] The fineness of the staple fiber of a super-thin synthetic fiber has 0.01 thru/or the desirable range of 0.5 deniers. It is because it becomes what has a part for the pilomotor area with the inadequate fineness of less than 0.01 deniers formed in the polyurethane resin fine porous-layer upper part made into the aim of this invention, and the content of the staple fiber in the part which the homogeneity distribution to a polyurethane resin solution is difficult, and carries out grinding of the polyurethane resin also serves as imperfection, and becomes uneven [a piloerection condition], so it becomes difficult to attain the expected effectiveness of this invention in the fineness which exceeds 0.5 deniers reversely. Moreover, the fiber length of the staple fiber of a super-thin synthetic fiber has the desirable

range of 0.1mm thru/or 1mm. Die length of less than 0.1mm twists by the die length which it becomes easy to produce omission of a staple fiber in the grinding after foam formation, and does not turn into piloerection die length sufficient again, and exceeds 1mm for the homogeneity distribution to the polyurethane resin solution of a staple fiber to become very difficult.

[0010] There is physical or the approach of carrying out exfoliation division by chemical preparation about the approach and exfoliation assembled-die bicomponent fiber which can use the approach of common use as a manufacturing method of the staple fiber of a super-thin synthetic fiber, for example, carry out dissolution clearance of the part for Kaifu of sea-island-structure fiber here. However, it is not restrained by especially these manufacturing methods. Moreover, the class of staple fiber of a super-thin synthetic fiber changes also with the manufacturing methods of the above-mentioned staple fiber. That is, although the fiber of the approach of carrying out dissolution clearance of the part for Kaifu of sea-island-structure fiber generally consists only of one sort, by the approach of carrying out exfoliation division by chemical preparation, fiber becomes physical or the thing which mixed two or more sorts about another side and an exfoliation assembled-die bicomponent fiber. Furthermore, in order to optimize the condition of the piloerection formed in a polyurethane resin fine porous layer, it is also possible to use what mixed the staple fiber of other super-thin synthetic fibers later for the staple fiber of the super-thin synthetic fiber obtained from the above-mentioned manufacturing method.

[0011] The content in the polyurethane resin of the staple fiber of this super-thin synthetic fiber cannot form a part for pilomotor area with a fiber consistency sufficient in under the 0.1 weight section to the polyurethane resin 100 weight section, and the effectiveness of abrasives which was excellent in this invention is not acquired. Since the homogeneity distribution to the polyurethane resin of the staple fiber of a super-thin synthetic fiber becomes very difficult, and a fiber consistency becomes high too much and the fine porosity cellular structure deforms greatly when a content exceeds 20 weight sections to the polyurethane resin 100 weight section reversely, adjusting to the optimal cellular structure becomes it is remarkable and difficult. In addition, as for the polyurethane fine porous layer containing the fiber of high density, the endurance asked for it as abrasives since reinforcement falls greatly is not acquired. Therefore, the optimal desirable contents of the staple fiber of these super-thin synthetic fibers added to polyurethane resin are the staple fiber 0.1 weight section of a super-thin synthetic fiber - 20 weight sections to the polyurethane resin 100 weight section. Moreover, the thickness of the abrasives layer to which the polyurethane resin fine porosity cellular structure upper part was made to carry out the piloerection of the staple fiber of the super-thin synthetic fiber obtained eventually has a good thing in the range of 200 micrometers thru/or 600 micrometers.

[0012] The polyurethane resin which constitutes the abrasives layer of this invention can be selected from what is generally used for synthetic leather and artificial leather. as the class shown especially as an example of polyurethane resin as a class shown from the polyol component of the presentation from the isocyanate component which are polyester system polyurethane resin, polyether system resin, polyether polyester copolymerization resin, polycarbonate system resin, etc., and is further used as a part of the presentation although not limited -- yellowing -- a type ---less -- yellowing -- it is called by the classification of a type etc.

[0013] Moreover, the plastic film chosen from the group which consists of Nylon, polypropylene resin, polyethylene resin, polyester resin, polyvinyl chloride resin, etc. as a base material for the abrasives of this invention can be used. However, when physical characteristics required of the base material of abrasives, such as dimensional stability, thermal resistance, and chemical resistance, are taken into consideration, biaxial drawing polyester film is the optimal base material. Although a limit has the thickness of the base material for abrasives naturally with the thickness as [whole] abrasives demanded, it is the range of 10 micrometers thru/or 200 micrometers, and if it is this range, practical enough abrasives will be obtained. It is because thickness of the abrasives layer formed on it is not securable enough in the case where it is made the thickness which sufficient physical characteristic for which abrasives are asked is not acquired in the case where it is made the thickness of less than 10 micrometers, and exceeds 200 micrometers, so practical abrasives cannot be obtained.

[0014] The abrasives of this invention can be fundamentally manufactured like the abrasives which had

the fine porosity cellular structure exposed by the grinding of conventional polyurethane resin. That is, the polyurethane resin containing the staple fiber of super-thin synthetic fibers, such as polyester of the 0.1 weight sections thru/or 20 weight sections, is made to apply and solidify to the polyurethane resin 100 weight section, and the polyurethane resin fine porous layer containing the staple fiber of a super-thin synthetic fiber is made to form on the base material for abrasives, such as polyester film. Subsequently, the abrasives layer which has a part for the pilomotor area of the staple fiber of a uniform super-thin synthetic fiber can be formed in the upper part of the fine porosity cellular structure by carrying out grinding of the front face with the buff machine which attached the sandpaper for the polyurethane resin fine porous layer formed in this way.

[0015] When the abrasives of above this inventions were used and chemical polishing of the hard disk, the glass, or the semi-conductor which is the ground body was carried out, as compared with the case where the abrasives to which grinding of the front face of the polyurethane resin fine porous layer known from the former was carried out, and the fine porosity cellular structure was exposed are used, generating of a scratch blemish decreased remarkably. this invention persons were especially able to acquire the scratch depressor effect of the expected more than by examining the fineness of the above staple fibers of a super-thin synthetic fiber which make the optimal the piloerection condition of the staple fiber of the super-thin synthetic fiber of the upper part of an abrasives layer, die length, and a polyurethane resin fine porous-layer mixture ratio. Although the reason which can control a scratch blemish by using the abrasives of this invention is not clear The amount of [of the abrasives layer of the abrasives of this invention / of the polyurethane resin fine porosity cellular structure upper part] pilomotor area Probably spacing of abrasives and the ground body is adjusted suitably, and the fiber aggregate controls secondary condensation of an abrasive material, and it is surmised by having eliminated efficiently the polish waste which may be further produced by condensation that the scratch blemish of the ground body is decreased.

[0016]

[Example] Hereafter, based on one example of the abrasives which do not limit this invention, this invention is explained further.

On biaxial drawing polyester film with an example 1 thickness of 100 micrometers, the polyurethane resin solution compound containing a No.1 polyester super-thin synthetic fiber which consists of a combination presentation shown below is applied so that it may become 1.00mm in thickness, and it is immersed promptly at the coagulation tub of a dimethyl formamide 10% water solution. After carrying out an indirect desulfurization solvent for 3 minutes, the dimethyl formamide which remains by repeating **** 12 times in the cistern heated at 50 degrees C is fully washed. Then, what was dried for 5 minutes with hot air drying equipment with a temperature of 120 degrees C is rolled round. The result thickness of this intermediate product was 650 micrometers on the whole.

(Combination No.1)

Chris Bon R*18166 100 weight section Chris Bon R*1 reed star SD-7 2 weight section Chris Bon R*1 reed star SD-11 One weight section pigment Ten weight sections DMF 100 weight sections polyester super-thin synthetic fiber Three weight sections (fineness: 0.05 deniers, die-length:0.3mm)

*1) Trademark Chris Bon (Dainippon Ink & Chemicals, Inc. make)

Subsequently, primary grinding is carried out with the buff machine which attached the sandpaper of 120 meshes for the polyurethane resin fine porous-layer front face which carried out [above-mentioned] wet coagulation, and with the buff machine which subsequently attached the sandpaper of 360 meshes, secondary grinding is carried out and it finishes. In secondary grinding, spacing of a back roll and a sandpaper is finely tuned so that the configuration of the fine porosity cellular structure and the condition of the piloerection formed on it, the whole thickness, and the thickness of an abrasives layer may go into the range of regular. The thickness of the obtained whole abrasives was 550 micrometers, and the thickness of the abrasives layer which consists of a polyurethane resin fine porous layer which carried out the piloerection was 450 micrometers. When observed under the microscope, it was checked that the piloerection of the staple fiber of a uniform super-thin synthetic fiber is formed in the fine porosity cel upper part used as the front face of the abrasives of this example.

[0017]
[Effect of the Invention] The abrasives of this invention have the abrasives layer which has a part for the pilomotor area of the staple fiber of a precise super-thin synthetic fiber in the upper part of a polyurethane resin fine porous layer as above. And when chemical mechanical polishing, such as the so-called hard disk, glass, or a semi-conductor, is performed, compared with the case where the abrasives to which grinding of the front face of a polyurethane resin porous layer like before was carried out, and only the fine porosity cellular structure was exposed are used, generating of a scratch blemish is decreased remarkably. In addition, since it becomes the process by which adding the staple fiber of a super-thin synthetic fiber is only added to a polyurethane resin abrasives component to the conventional manufacture approach in manufacture of the abrasives of this invention, it is possible to succeed in the manufacture, without hardly changing a production process. Therefore, this invention can obtain the abrasives which were excellent in the application as a hard disk, glass, or abrasives for chemical polishing for semi-conductors, without performing the large design change of a production process.

[Translation done.]

* NOTICES *

1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

TECHNICAL FIELD

[Field of the Invention] This invention is a hard disk, glass, or the abrasives for chemical polishing for semi-conductors, and relates to the abrasives especially used at the time of those manufactures etc. The abrasives of this invention are the abrasives improved in order to suppress that divide and a scratch blemish occurs on the ground body.

[Translation done.]

* NOTICES *

1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

CLAIMS

[Claim(s)]
[Claim 1] In the base material for abrasives, and the abrasives for chemical polishing which consist of an abrasives layer which is a polyurethane resin fine porous layer formed on this base material, and the fine porosity cellular structure has exposed by the grinding of the front face The staple fiber of a super-thin synthetic fiber does not have the 0.1 weight section in said polyurethane resin fine porous layer to this polyurethane resin 100 weight section, and 20 weight sections content is carried out. And abrasives for chemical polishing characterized by the piloerection of the staple fiber of said super-thin synthetic fiber being carried out to the upper part of said abrasives layer by the grinding of this polyurethane resin fine porous layer.
[Claim 2] They are the abrasives for chemical polishing according to claim 1 which carry out the description of the staple fiber of said super-thin synthetic fiber being a synthetic fiber chosen from the group which consists of nylon fiber, polyester fiber, an acrylic fiber, a polypropylene fiber, and a polyethylene fiber, the fineness being in the range of 0.01 deniers thru/or 0.5 deniers, and the die length being in the range of 0.1mm thru/or 1mm, and said staple fiber consisting of said one sort of synthetic fibers, or consisting of mixture of two or more sorts of said synthetic fibers further.
[Claim 3] They are the abrasives for chemical polishing according to claim 1 characterized by the thickness of said abrasives layer being in the range of 200 micrometers thru/or 600 micrometers.
[Claim 4] They are the abrasives for chemical polishing according to claim 1 which said base material for abrasives is the plastic film chosen from the group which consists of Nylon, polypropylene resin, polyethylene resin, polyester resin, and polyvinyl chloride resin, and are characterized by the thickness being in the range of 10 micrometers thru/or 200 micrometers.
[Claim 5] They are the abrasives for chemical polishing given in any 1 term among claim 1 which is the abrasives for a hard disk, glass, or semi-conductors thru/or claim 4.

[Translation done.]

(19)日本国特許庁(JP)　(12)公開特許公報（A）　(11)特許出願公開番号

特開２００２－１６６３５２
(Ｐ２００２－１６６３５２Ａ)
(43)公開日　平成14年6月11日(2002.6.11)

(51)Int.Cl.⁷	識別記号	FI		テーマコード(参考)
Ｂ２４Ｂ　37/00		Ｂ２４Ｂ　37/00	Ｃ	3C058
Ｈ０１Ｌ　21/304	６２２	Ｈ０１Ｌ　21/304	６２２　Ｆ	

審査請求　未請求　請求項の数５　ＯＬ　(全５頁)

(21)出願番号　特願2000-362599(P2000-362599)

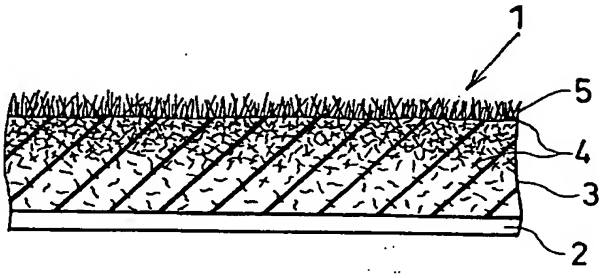
(22)出願日　平成12年11月29日(2000.11.29)

(71)出願人　595085022
株式会社ニッセン
大阪府羽曳野市川向222番地の2
(72)発明者　早川　哲生
大阪府柏原市法善寺4丁目363の1
(74)代理人　100068618
弁理士　萼　経夫　(外3名)

Ｆターム(参考)　3C058 AA07 AA09 AC04 CB01 DA17

(54)【発明の名称】湿式研磨用研磨材

(57)【要約】
【課題】　ハードディスク、ガラス、半導体の湿式研磨時に、被研磨体のスクラッチ傷の発生の少ない研磨材を提供する。
【解決手段】研磨材用基材と、該基材の上に形成されたポリウレタン樹脂微多孔層であって、その表面の研削により微多孔セル構造が露出している研磨材層よりなる、湿式研磨用研磨材において、極細合成繊維の短繊維が前記ポリウレタン樹脂微多孔層に、該ポリウレタン樹脂１００重量部に対して０．１重量部ないし２０重量部含有され、そして該ポリウレタン樹脂微多孔層の研削により前記極細合成繊維の短繊維が前記研磨材層の上部に立毛されていることを特徴とする、湿式研磨用研磨材。



1

【特許請求の範囲】

【請求項１】　研磨材用基材と、該基材の上に形成されたポリウレタン樹脂微多孔層であって、その表面の研削により微多孔セル構造が露出している研磨材層よりなる、湿式研磨用研磨材において、極細合成繊維の短繊維が前記ポリウレタン樹脂微多孔層に、該ポリウレタン樹脂１００重量部に対して０．１重量部ないし２０重量部含有され、そして該ポリウレタン樹脂微多孔層の研削により前記極細合成繊維の短繊維が前記研磨材層の上部に立毛されていることを特徴とする、湿式研磨用研磨材。

【請求項２】　前記極細合成繊維の短繊維は、ナイロン繊維、ポリエステル繊維、アクリル繊維、ポリプロピレン繊維およびポリエチレン繊維からなる群より選択された合成繊維であり、その繊度は０．０１デニールないし０．５デニールの範囲にあり且つその長さは０．１ｍｍないし１ｍｍの範囲にあり、さらに前記短繊維は１種の前記合成繊維よりなるかまたは２種以上の前記合成繊維の混合物よりなることを特徴する、請求項１記載の湿式研磨用研磨材。

【請求項３】　前記研磨材層の厚さは、２００μｍないし６００μｍの範囲にあることを特徴とする、請求項１記載の湿式研磨用研磨材。

【請求項４】　前記研磨材用基材は、ナイロン樹脂、ポリプロピレン樹脂、ポリエチレン樹脂、ポリエステル樹脂およびポリ塩化ビニル樹脂からなる群より選択されたプラスチックフイルムであって、その厚さは、１０μｍないし２００μｍの範囲にあることを特徴とする、請求項１記載の湿式研磨用研磨材。

【請求項５】　ハードディスク、ガラスまたは半導体向けの研磨材である請求項１ないし請求項４のうちいずれか一項記載の湿式研磨用研磨材。

【発明の詳細な説明】

【０００１】

【発明の属する技術分野】本発明は、ハードディスク、ガラスまたは半導体向けの湿式研磨用研磨材であって、特に、それらの製造時等に使用される研磨材に関する。本発明の研磨材は、とりわけ、被研磨体にスクラッチ傷が発生するのを抑えるべく改良された研磨材である。

【０００２】

【従来の技術】ハードディスク、ガラス、半導体製造時等に、いわゆる化学的機械研磨、即ち研磨剤を滴下しながら行われる研磨加工に使用される湿式研磨材として、プラスチックフィルム、例えばポリエステルフイルム等の基材上にポリウレタン樹脂微多孔層を形成させ、その表面を研削して微多孔セル構造を露出させた研磨材は、既に実用化されている。

【０００３】

【発明が解決しようとする課題】しかしながら、上記のような研磨材は、研磨中に被研磨体にスクラッチ傷が発生じやすいという問題がある。その原因としては以下の

2

ことが考えられる。まず、上記のような研磨材はその製造時にポリウレタン樹脂微多孔層のセルサイズを大きめに調整した場合であっても、比較的その研磨する表面の平滑性が高くなりやすい。また、研磨材と被研磨体との間隔（研磨剤の粘性や研磨粒子の粒度、研磨材と被研磨体間の相対速度等よってのみ決定される）は比較的狭いので、研磨中に研磨剤の二次凝集が起こりやすく、また研磨により生ずる研磨屑を効率的に排除できないので研磨剤と研磨屑のたまりが生じやすい。その結果、被研磨体を研磨剤の凝集物の相対的に大きな塊とともに比較的平滑な研磨材で研磨することとなり、被研磨体にスクラッチ傷を発生させると考えられる。

【０００４】本発明者らは上記問題を解決するべく、ハードディスク、ガラス、半導体に使用するための、湿式研磨材を鋭意検討した。そして、発泡前に予め極細合成繊維の短繊維を混合したポリウレタン樹脂微多孔層の上部を研削することにより得られる、多孔セル構造上部に該短繊維を立毛させた研磨材層をもつ研磨材を製造し、この研磨材を用いて、上述のような湿式研磨を行ったところ、被研磨体であるハードディスク、ガラス、半導体表面のスクラッチ傷の発生を極めて減少させることができることを見出した。

【０００５】

【課題を解決するための手段】従って、本発明は、研磨材用基材と、該基材の上に形成されたポリウレタン樹脂微多孔層であって、その表面の研削により微多孔セル構造が露出している研磨材層よりなる、湿式研磨用研磨材において、極細合成繊維の短繊維が前記ポリウレタン樹脂微多孔層に、該ポリウレタン樹脂１００重量部に対して０．１重量部ないし２０重量部含有され、そして該ポリウレタン樹脂微多孔層の研削により前記極細合成繊維の短繊維が前記研磨材層の上部に立毛されていることを特徴とする、湿式研磨用研磨材に関するものである。以下、本発明の研磨材の構成を各部材ごとに説明する。

【０００６】

【発明の実施の形態】上記研磨材層に使用される、ポリウレタン樹脂微多孔層は、一般に湿式凝固法と呼ばれる公知の方法で形成される。即ち、これはポリウレタン樹脂を親水性溶媒、例えばジメチルフォルムアミド等に溶解した溶液を基材上に塗布した後、水、アルコール等、そのポリウレタン樹脂の非溶媒に浸漬することにより形成される発泡体層である。従来は、この形成されたポリウレタン樹脂微多孔層の上部、即ち基材と反対側の部分を単に研削することによって、該樹脂の微多孔セル構造の孔部分と壁部分を露出させ、その凹凸表面を研磨材層表面としていた。しかし本発明では、このポリウレタン樹脂に極細合成繊維の短繊維を添加したものを用いて、基材上で発泡体させポリウレタン樹脂微多孔層を形成し、そして該ポリウレタン樹脂微多孔層を研削することにより、微多孔セル構造を露出させ、かつ研磨材層の上

部に前記極細合成繊維の短繊維を立毛させることを特徴とする。具体的に、本発明の研磨材の構造を模式的に図１に示す。すなわち、本発明の研磨材１は研磨材用基材２の上に、研磨材層として極細合成繊維の短繊維４を混合したポリウレタン樹脂微多孔層３を形成している。ポリウレタン樹脂微多孔層３はその上部を研削して露出させることにより、立毛された極細合成繊維の短繊維５をその上部に有している。

【０００７】ポリウレタン樹脂研磨材層上に立毛させるために、ポリウレタン樹脂に添加する極細合成繊維の短繊維は、特に限定されるものではないが、ナイロン繊維、ポリエステル繊維、アクリル繊維、ポリプロピレン繊維およびポリエチレン繊維からなる群より選択される合成繊維よりなる。特に望ましい極細合成繊維は、極細化が容易であるナイロン繊維、ポリエステル繊維である。これら極細合成繊維は１種のみものでも極細合成繊維の２種以上を混合したものでもよい。

【０００８】極細合成繊維の短繊維はポリウレタン樹脂溶液よりも比重が軽いことから、また発泡の際の気泡が層の上表面に向かって移動することを考慮すると、ポリウレタン樹脂層の上部ほど、該極細合成繊維の密度は高くなるであろう。従って、形成されたポリウレタン樹脂微多孔層の表層上部を研削することにより得られるポリウレタン樹脂多孔層表面はかなり緻密に立毛されることが期待される。本発明の研磨層においては、立毛される極細合成繊維の短繊維の立毛状態は緻密さが求められる一方、極細合成繊維の短繊維を含むポリウレタン樹脂は、研磨材として、均質な微多孔セル構造を形成するように、均質に発泡するようにしなければならない。そこで、極細合成繊維の短繊維の繊度、長さ、混合比率はこれらの条件に最も適合する範囲を検討する必要がある。

【０００９】極細合成繊維の短繊維の繊度は０．０１ないし０．５デニールの範囲が望ましい。０．０１デニール未満の繊度では本発明の狙いとするポリウレタン樹脂微多孔層上部に形成される立毛部分が不十分なものとなり、反対に０．５デニールを越える繊度ではポリウレタン樹脂溶液への均一分散が難しく、ポリウレタン樹脂を研削する部分における短繊維の含有量も不十分となって、立毛状態も不均一となるため、本発明の所期の効果を達成することは難しくなるからである。また、極細合成繊維の短繊維の繊維長さは０．１ｍｍないし１ｍｍの範囲が望ましい。０．１ｍｍ未満の長さでは発泡体形成後の、研削中に短繊維の脱落が生じやすくなりまた十分な立毛長さにならず、かつ１ｍｍを越える長さでは短繊維のポリウレタン樹脂溶液への均一分散が極めて困難となることによる。

【００１０】ここで、極細合成繊維の短繊維の製造法としては慣用の方法が使用でき、例えば海島構造繊維の海部分を溶解除去する方法、剥離分割型複合繊維を物理的あるいは化学的処理で剥離分割する方法がある。しかし、これら製造法に特に拘束されるものではない。また、極細合成繊維の短繊維の種類は、上記短繊維の製造法によっても変化する。即ち、海島構造繊維の海部分を溶解除去する方法の繊維は一般には１種のみからなるが、他方、剥離分割型複合繊維を物理的あるいは化学的処理で剥離分割する方法では繊維は２種以上を混合したものとなる。さらに、ポリウレタン樹脂微多孔層に形成される立毛の状態を最適化するために、上記製造法から得られた極細合成繊維の短繊維に、他の極細合成繊維の短繊維を後から混合したものを使用することも可能である。

【００１１】この極細合成繊維の短繊維のポリウレタン樹脂における含有量は、ポリウレタン樹脂１００重量部に対し０．１重量部未満では繊維密度の十分な立毛部分が形成できず、本発明の優れた研磨材の効果が得られない。反対にポリウレタン樹脂１００重量部に対し、含有量が２０重量部を超える場合には、極細合成繊維の短繊維のポリウレタン樹脂への均一分散が極めて困難となり、且つ繊維密度が高くなり過ぎて微多孔セル構造が大きく変形するため、最適なセル構造に調整することは著しく困難となる。加えて、高密度の繊維を含有するポリウレタン微多孔層は強度が大きく低下するので、研磨材として求められる耐久性が得られない。従って、ポリウレタン樹脂に添加するこれらの極細合成繊維の短繊維の好ましい最適な含有量はポリウレタン樹脂１００重量部に対し、極細合成繊維の短繊維０．１重量部～２０重量部である。また、最終的に得られる極細合成繊維の短繊維をポリウレタン樹脂微多孔セル構造上部に立毛させた研磨材層の厚さは２００μｍないし６００μｍの範囲にあるものがよい。

【００１２】本発明の研磨材層を構成する、ポリウレタン樹脂は一般に合成皮革、人工皮革に使用されるものから選定できる。ポリウレタン樹脂の例としては、特に限定されるものではないが、その組成のポリオール成分から示される種類としては、ポリエステル系ポリウレタン樹脂、ポリエーテル系樹脂、ポリエーテル・ポリエステル共重合樹脂、ポリカーボネート系樹脂等であり、更にその組成の一部として使用されるイソシアネート成分から示される種類としては、黄変タイプ、無黄変タイプ、等の分類で呼ばれるものである。

【００１３】また、本発明の研磨材用の基材としては、ナイロン樹脂、ポリプロピレン樹脂、ポリエチレン樹脂、ポリエステル樹脂、ポリ塩化ビニル樹脂等からなる群より選択されたプラスチックフイルムが使用できる。しかし、寸法安定性、耐熱性、耐薬品性等、研磨材の基材に要求される物理的特性を考慮すると２軸延伸ポリエステルフイルムが最適な基材である。研磨材用基材の厚さは、要求される研磨材としての全体の厚さにより自ずから制限があるが、１０μｍないし２００μｍの範囲であり、この範囲ならば十分実用性のある研磨材が得られ

る。１０μｍ未満の厚さにした場合では、研磨材に求められる十分な物理的特性が得られず、また２００μｍを越える厚さにした場合では、その上に形成される研磨材層の厚さを十分確保できないので、実用性のある研磨材を得ることはできないからである。

【００１４】本発明の研磨材は、基本的には従来のポリウレタン樹脂の研削により微多孔セル構造を露出された研磨材と同様に製造することができる。即ち、ポリエステルフィルム等の研磨材用の基材上に、ポリウレタン樹脂１００重量部に対し、０．１重量部ないし２０重量部のポリエステル等の極細合成繊維の短繊維を含むポリウレタン樹脂を塗布し、凝固させて、極細合成繊維の短繊維を含むポリウレタン樹脂微多孔層を形成させる。ついで、このように形成されたポリウレタン樹脂微多孔層を、サンドペーパーを取り付けたバフ機によりその表面を研削することにより、微多孔セル構造の上部に均一な極細合成繊維の短繊維の立毛部分を有する研磨材層が形成することができる。

【００１５】上記のような本発明の研磨材を使用して、被研磨体である、ハードディスク、ガラスまたは半導体を湿式研磨した場合には、従来から知られているポリウレタン樹脂微多孔層の表面を研削して微多孔セル構造を露出させた研磨材を使用する場合と比較してスクラッチ傷の発生が著しく減少した。とりわけ、本発明者らは研磨材層の上部の極細合成繊維の短繊維の立毛状態を最適にする、上述のような極細合成繊維の短繊維の繊度、長さ、ポリウレタン樹脂微多孔層混合比率を検討することによって、予想された以上のスクラッチ抑制効果を得ることができたのである。本発明の研磨材を使用することによってスクラッチ傷を抑制できる理由は明らかではないが、本発明の研磨材の研磨材層の、ポリウレタン樹脂微多孔セル構造上部の立毛部分が、おそらく研磨材と被研磨体との間隔を適当に調整し、且つその繊維集合体が研磨剤の２次凝集を抑制し、さらに凝集により生じ得る研磨屑を効率的に排除していることにより被研磨体のスクラッチ傷を減少させると推測される。

【００１６】

【実施例】以下、本発明を限定することのない研磨材の一実施例に基づいて、本発明をさらに説明する。

実施例１

厚さ１００μｍの２軸延伸ポリエステルフィルムの上に、以下に示す配合組成からなるＮｏ．１ポリエステル極細合成繊維入りポリウレタン樹脂溶液配合物を厚さ１．００ｍｍとなるように塗布し、直ちにジメチルフォルムアミド１０％水溶液の凝固槽に浸漬する。３分間脱溶媒をした後、５０℃に加熱した水槽で、搾液を１２回繰り返すことによって残留しているジメチルフォルムアミドを十分に洗浄する。その後、温度１２０℃の熱風乾燥機で５分間乾燥したものを巻き取る。この中間製品の仕上がり厚さは全体で６５０μｍであった。

（配合Ｎｏ．１）

クリスボン[*1]８１６６	１００重量部
クリスボン[*1]アシスターＳＤ－７	２重量部
クリスボン[*1]アシスターＳＤ－１１	１重量部
顔料	１０重量部
ＤＭＦ	１００重量部
ポリエステル極細合成繊維	３重量部

（繊度：０．０５デニール、長さ：０．３ｍｍ）

＊１）登録商標クリスボン（大日本インキ化学工業株式会社製）

次いで、上記湿式凝固したポリウレタン樹脂微多孔層表面を、１２０メッシュのサンドペーパーを取り付けたバフ機で一次研削をし、次いで３６０メッシュのサンドペーパーを取り付けたバフ機で二次研削して仕上げる。二次研削では、微多孔セル構造の形状、及びその上に形成される立毛の状態、全体の厚さ、研磨材層の厚さが規定の範囲に入るよう、バックロールとサンドペーパーの間隔を微調整する。得られた研磨材全体の厚さは、５５０μｍであり、立毛させたポリウレタン樹脂微多孔層よりなる研磨材層の厚さは４５０μｍであった。顕微鏡で観察したところ、本実施例の研磨材の表面となる微多孔セル上部に均一な極細合成繊維の短繊維の立毛が形成されていることが確認された。

【００１７】

【発明の効果】以上のとおり、本発明の研磨材はポリウレタン樹脂微多孔層の上部に緻密な極細合成繊維の短繊維の立毛部分をもつ研磨材層を有する。そして、いわゆるハードディスク、ガラスまたは半導体等の化学的機械研磨を行った場合、従来のようなポリウレタン樹脂多孔層の表面を研削して微多孔セル構造のみを露出させた研磨材を使用した場合と比べ、スクラッチ傷の発生を著しく減少させる。加えて、本発明の研磨材の製造にあたっては、ポリウレタン樹脂研磨材成分に極細合成繊維の短繊維を添加することのみが従来の製造方法に対して付加される工程となるので製造工程を殆ど変えずに、その製造を為すことが可能である。従って、本発明は製造工程の大幅な設計変更を行わずに、ハードディスク、ガラスまたは半導体向け湿式研磨用研磨材としての用途において優れた研磨材を得ることができる。

【図面の簡単な説明】

【図１】本発明の研磨材の模式断面図である。

【符号の説明】

１：研磨材
２：基材
３：ポリウレタン樹脂微多孔層
４：極細合成繊維の短繊維
５：立毛された極細合成繊維の短繊維

【図１】